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Impaired ability to give a meaning to personally significant events in patients with schizophrenia

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ABSTRACT

Schizophrenia is a severe mental illness affecting sense of identity. Autobiographical memory deficits observed in schizophrenia could contribute to this altered sense of identity. The ability to give a meaning to personally significant events (meaning making) is also critical for identity construction and self-coherence. Twenty-four patients with schizophrenia and 24 control participants were asked to recall five self-defining memories. We assessed meaning making in participants' narratives (spontaneous meaning making) and afterwards asked them explicitly to give a meaning to their memories (cued meaning making). We found that both spontaneous and cued meaning making were impaired in patients with schizophrenia. This impairment was correlated with executive dysfunctions and level of negative symptoms. Our results suggest that patients' difficulties in drawing lessons about past experiences could contribute to explain the lack of coherence observed in their life trajectories and their impaired social adjustment abilities. Implications for psychotherapy are also discussed.

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1. Introduction

Several studies have demonstrated autobiographical memory deficits in schizophrenia. Patients' ability to recall personal events and facts is reduced (Baddeley, Thornton, Chua, & McKenna, 1996; Feinstein, Goldberg, Nowlin, & Weinberger, 1998; Riutort, Cuervo, Danion, Peretti, & Salamé, 2003). Their memories are less specific (Baddeley et al., 1996; Cuervo-Lombard et al., 2007; D'Argembeau, Raffard, & Van der Linden, 2008; Danion et al., 2005; de Oliveira, Cuervo-Lombard, Salamé, & Danion, 2009; Harrison & Fowler, 2004; Neumann, Blairy, Lecompte, & Philippot, 2007; Riutort et al., 2003; Seidl, Lässer, Schmid, & Herold, 2009; Warren & Haslam, 2007; Wood, Brewin, & McLeod, 2006) and associated with an impairment of conscious recollection (Cuervo-Lombard et al., 2007; Danion et al., 2005; de Oliveira et al., 2009; Neumann et al., 2007). Finally, Cuervo-Lombard et al. (2007) demonstrated a disorganized reminiscence bump in patients with schizophrenia. The reminiscence bump corresponds to an oversampling of autobiographical memories from late adolescence and early adulthood, a critical time for the formation of personal identity. These authors interpreted its impairment in patients with

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schizophrenia as reflecting abnormal development and consolidation of personality. Given that most of these autobiographical memory deficits were more pronounced after the period of adolescence (Cuervo-Lombard et al., 2007; Feinstein et al., 1998; Riutort et al., 2003), they appear to provide evidence that the overall autobiographical grounding of the self is damaged in schizophrenia. They may explain impoverished life narratives or vague autobiographical memories encountered by most psychiatrists in their clinical practice. However, they do not account for other characteristics of patients' life narratives, like a lack of coherence or disruptions that are usually observed by clinicians when patients are asked to narrate their own lives (Lysaker & Lysaker, 2001; Searles, 1966). Narrative incoherence in schizophrenia may reflect chaotic life trajectories due to the illness and is a source of great anguish to patients; as such better understanding and being able to treat this is of great importance. Recent work by Lysaker, Wickett, and Davis (2005) showed a link between a lack of narratives coherence and negative symptoms and flexibility of abstract thoughts. However, whether these deficits may be the sole cause of the lack of coherence in life narratives is still unknown.

Coherence in life narratives seems to stem more from the personal meaning of memories, lessons, and insights drawn from past events than from memories *per se* (Habermas & de Silveira, 2008; McLean, 2005). The ability to learn from a past event is referred to as "meaning making" (Blagov & Singer, 2004), which is observed when people explain how they get insight into themselves or others after having experienced a particular event. Growing consideration has been given to meaning making over the last decade. It is a critical factor for the development of the self in allowing autobiographical memories to be integrated into a more abstract and coherent representation of oneself (Blagov & Singer, 2004). Self-coherence is of great importance for stability of the self, especially when people are faced with life experiences that potentially call into question their beliefs about the self or self-images (Conway, Meares, & Standart, 2004; Sutherland & Bryant, 2005). Moreover, learning and drawing insights from past experiences is critical for social adjustment and decision making in everyday life, preventing individuals from repeating inadequate past behavior (Singer, 2004). Habermas and Bluck (2000) argued that the ability to create coherent life narratives involves autobiographical reasoning processes, i.e. processes of self-reflective thinking or talking about past events that form links between events and the self in an attempt to relate one's personal past and present. Until now, however, cognitive processes involved in the ability to give a meaning to past experiences remain unknown since, as far as we know, no study has ever investigated the cognitive functions involved in the complex metacognitive processes that lead healthy subjects to give a meaning to significant memories.

The experimental exploration of meaning making requires participants to retrieve memories they consider highly significant for them. Singer and Salovey (1993) called these "self-defining memories". They point to important events or turning points from which people acquire a better understanding of who they are as individuals. Usually they reflect dominant themes (e.g. unresolved conflicts or enduring concerns) in an individual's life and often serve as anchors for identity at transitional times of life to remind them of their core identity (Singer, 2004). Nevertheless, they can only be integrated into a coherent representation of the self if they are associated with meaning making (Blagov & Singer, 2004). Two recent studies have addressed self-defining memories in schizophrenia (Raffard et al., 2009; Raffard et al., 2010). Although the authors concluded that meaning making is impaired in patients with schizophrenia, their conclusion may be challenged because the study only regarded meaning making as the ability to mention spontaneously how a memory was important for an individual. However, poor spontaneous meaning making can be interpreted either as an inability to give meaning to a personal event, or simply as a greater tendency to relate facts rather than the consequences or meaning of an event (Trapnell & Campbell, 1999) or even as a result of people choosing memories not related to really significant events. In other words, to demonstrate an inability to give meaning to personal events in schizophrenia, it is necessary to show that under conditions where patients do select highly significant events, impaired meaning making is observed not only when a meaning can be given spontaneously but also when explicitly cued by the experimenter. If a difference is observed between patients and controls only for spontaneous and not for cued meaning making, other hypotheses have to be envisioned. Furthermore, several factors known to influence meaning making should be considered potential confounding factors before concluding that patients display deficits. As for social contributing factors, the opportunity to share personal experiences with other people (e.g. family members) was shown to influence meaning making especially when self-explanation is encouraged (McLean, 2005). Given that patients with schizophrenia often lack social contacts (Broome et al., 2005) or communication within a family (Dixon & Lehman, 1995), we assume that less frequent memory telling in patients could mean they are less at ease to talk about what they have learnt from past experiences. Other factors relating to events themselves might also make it more difficult for patients to give a meaning to their memories. Patients with schizophrenia have experienced more traumatic experiences in their life than non psychiatric people (Bebbington et al., 2004) and memories relating to illness (psychotic episode, hospitalization) are frequently experienced as traumatic (Harrison & Fowler, 2004). Insofar as it is sometimes difficult to extract meaning from these kinds of traumatic memories (Conway, Singer, & Tagini, 2004; Conway et al., 2004), a higher proportion of traumatic self-defining memories in patients could also lead to a reduction in meaning making that would depend not on patients' inability to make meaning but on factors relating to events.

The first objective of this study was to investigate meaning making in schizophrenia using a protocol that explicitly asked participants to give meaning to their recalled self-defining memories and that controlled potential confounding factors. The second objective was to explore potential mechanisms underlying this impairment of meaning making in schizophrenia. Given that executive functions are impaired in schizophrenia (Heinrichs & Zakzanis, 1998) we could reasonably hypothesize that this would affect patients' ability to think about past memories in an attempt to extract meaning from them. Furthermore, in accordance with Lysaker, Carcione, et al. (2005) who found that a higher level of symptoms in schizophrenia was associated with poorer metacognition, we assumed that meaning making could also be affected by clinical status. Based on

Table 1
Clinical and neuropsychological characteristics.

| | Control participants | Patients | Statistics | |
|------------------------------------|----------------------|----------------|------------|----------|
| | | | <i>t</i> | <i>p</i> |
| <i>n</i> | 24 | 24 | | |
| <i>Clinical measures</i> | | | | |
| Age (years) | 36.2 (6.8) | 35.3 (6.9) | 0.42 | 0.68 |
| Education (years) | 11.8 (2.0) | 11.5 (2.2) | 0.34 | 0.74 |
| RSE | 33.1 (4.6) | 32.0 (4.0) | 0.91 | 0.37 |
| Duration of illness (years) | – | 11.4 (5.0) | | |
| PANSS total score | – | 61.4 (17.7) | | |
| PANSS positive score | – | 15.1 (5.2) | | |
| PANSS negative score | – | 15.1 (7.5) | | |
| PANSS general score | – | 31.2 (9.4) | | |
| <i>Neuropsychological measures</i> | | | | |
| WAIS-R current IQ | 92.5 (10.5) | 89.8 (13.3) | 0.77 | 0.44 |
| f-NART premorbid IQ | 106.8 (6.6) | 104.2 (7.3) | 1.31 | 0.20 |
| Phonologic fluency | 43.9 (12.4) | 36.1 (9.2) | 2.43 | 0.02 |
| Semantic fluency | 56.9 (12.0) | 44.1 (9.6) | 4.01 | <0.001 |
| N-back | 23.4 (2.1) | 20.3 (3.2) | 4.09 | <0.001 |
| <i>Mental flexibility</i> | | | | |
| Median reaction time | 791.5 (206.0) | 1017.4 (212.7) | –2.65 | <0.001 |
| Number of errors | 2.5 (3.5) | 2.2 (2.8) | 0.24 | 0.81 |

Values given as mean (standard deviation). RSE, Rosenberg-Self-Esteem; PANSS, Positive And Negative Symptom Scale; WAIS-R, Wechsler Adult Intelligence Scale – Revised; f-NART, French National Adult Reading Test.

these elements, we made several assumptions: (1) compared to control participants, patients with schizophrenia would display an impairment of both spontaneous and experimenter-cued meaning making in narratives of self-defining memories; (2) this deficit would remain even after other factors potentially contributing to it had been taken into account; and (3) this deficit would be linked to executive functioning and level of symptoms.

2. Methods

2.1. Participants

Twenty-four outpatients (12 women) took part in the study. They all fulfilled the DSM-IV criteria (American Psychiatric Association, 1994) for schizophrenia (paranoid, $n = 21$; residual, $n = 2$; undifferentiated, $n = 1$) as determined by consensus of the current treating psychiatrist and two senior psychiatrists in the research team. All of the patients were clinically stabilized. Patients with a history of traumatic brain injury, epilepsy, alcohol and substance abuse, or other neurological conditions were excluded. Patients with current diagnosis of major depressive disorder, as defined by a score of >4 according to the Calgary Depression Scale for Schizophrenia (Addington, Addington, & Maticka-Tyndale, 1993) and patients with an IQ of less than 70, as assessed using a short form of the Wechsler Adult Intelligence Scale Revised (Crawford, Mychalkiw, Johnson, & Moore, 1996) were also excluded. All but one of the patients were taking long-term neuroleptic treatment (atypical, $n = 18$; typical, $n = 4$ and both typical and atypical, $n = 1$). Two were being treated with benzodiazepines, none with anti-epileptic mood stabilizer nor lithium. Seven were also receiving antiparkinsonian treatment. The comparison group comprised 24 control participants (12 women) with no history of psychiatric, neurologic disorders or substance abuse. Control participants were recruited via newspapers advertisements. Patients and controls did not differ for both age and level of education. In both groups, premorbid IQ was assessed by a French validated version of the National Adult Reading Test (Mackinnon & Mulligan, 2005) along with current IQ (Crawford et al., 1996) and level of self-esteem (Rosenberg, 1965; Vallières & Vallerand, 1990). Characteristics of patients and controls are presented in Table 1.

This research study was approved by the local ethical committee, and all participants gave their informed written consent.

2.2. Materials

2.2.1. Neuropsychological evaluations

The following tasks were selected to assess different kinds of executive functions that were shown to be involved in meta-cognitive processes (Lysaker et al., 2008) and may be involved in meaning making.

2.2.1.1. Verbal fluency. It was assessed using tasks (Cardebat, 1990) where participants had 120 s to give as many words as they could from given semantic categories (animals and fruits: semantic fluency) and starting with particular letters (French words starting with P and R: phonological fluency).

Table 2
Characteristics of the memories.

| | Control participants | Patients | Statistics | |
|---|----------------------|---------------|------------|----------|
| | | | <i>t</i> | <i>p</i> |
| <i>n</i> | 24 | 24 | | |
| <i>Characteristics of the memories</i> | | | | |
| Emotional valence | 2.56 (15.11) | −1.26 (13.92) | −0.91 | 0.37 |
| Traumatic memories ^a | 0.13 (0.16) | 0.19 (0.28) | −0.83 | 0.41 |
| Memories never shared with other people ^a | 0.10 (0.14) | 0.20 (0.23) | −1.66 | 0.10 |
| <i>Subjective impact and personal significance scales</i> | | | | |
| Subjective impact | 5.7 (1.1) | 6.0 (0.9) | −1.06 | 0.29 |
| Growth | 5.1 (1.2) | 4.8 (1.1) | 0.96 | 0.34 |
| Self-insight | 4.8 (1.4) | 4.8 (1.3) | −0.04 | 0.97 |
| Learning about life | 5.0 (1.2) | 4.9 (1.4) | 0.29 | 0.77 |
| Learning about others | 5.1 (1.0) | 4.8 (1.5) | 0.83 | 0.41 |
| Current thoughts about impact | 5.6 (1.1) | 5.7 (1.3) | −0.44 | 0.67 |
| Time spent thinking | 4.7 (1.6) | 4.9 (1.4) | −0.65 | 0.52 |

Values given as mean (standard deviation).

^a *t*-Test performed after arcsine transformation of proportions.

2.2.1.2. Updating. A 3-back task was used, during which 29 letters were read out one by one by the investigator. Participants had to listen to the letters and determine whether each new letter was one of the three previous ones (McMillan, Laird, Witt, & Meyerand, 2007)

2.2.1.3. Mental flexibility. We used the flexibility task from the *Test d'Evaluation de l'Attention* (TEA; Zimmermann & Fimm, 1993). One hundred letter/digit or digit/letter pairs were presented on a computer screen. Participants had in front of them a right and left button and were asked to alternate between pressing the button situated on the side of the letter and the button situated on the side of the digit. The side of the target changed at random and participants had to respond as quickly as possible. Median reaction time and number of errors were analyzed.

2.2.2. Self-defining memories questionnaire

An adaptation of the procedure initially proposed by Singer and Moffitt (1991) was used. Participants were asked to search for five self-defining memories. A self-defining memory was defined to them as follows: (a) It is at least 1 year old; (b) It is a memory from your life that you remember very clearly and that still feels important to you even as you think about it; (c) It is a memory that helps you to understand who you are as an individual and might be a memory you would tell someone else if you wanted that person to understand you in a basic way; (d) It may be a memory that is positive or negative, or both, in how it makes you feel now. The only important aspect is that it leads to strong feelings; and (e) It is a memory that you have thought about many times. It should be familiar to you like a picture you have studied or a song you have learnt by heart.

2.2.3. Subjective impact and personal significance scales

Subjective impact and general, non-specific aspects of personal significance of each memory were assessed using seven items on 7-point scales proposed by Wood and Conway (2006): (a) This past event has had a big impact on me; (b) I feel that I have grown as a person since experiencing this past event; (c) Having had this experience, I have more insight into who I am and what is important to me; (d) Having had this experience, I have learned more about what life is all about; (e) Having had this experience, I have learned more about what other people are like; (f) Even when I think of the event now, I think about how it has affected me; (g) I have often spent time thinking about what this event means to me. These scales were used to ensure that the retrieved memory met the criteria of a genuine self-defining memory, as described by the self-defining memory questionnaire.

2.2.4. The impact of events scale – revised (Brunet, St-Hilaire, Jehel, & King, 2003)

This is a scale comprising 22 items on 5-point scales assessing symptoms of post-traumatic stress disorder associated with memories. Memories associated with symptoms of PTSD (IES-R score of >24) were defined as traumatic memories (Asukai et al., 2002).

2.3. Procedure

The procedure consisted of two sessions. In the first session, clinical (CDSS, RSE and for patients: PANSS; Kay, Fiszbein, & Opler, 1987) and neuropsychological assessments (WAIS-R, f-NART, fluency, mental flexibility, updating) were performed. Then participants were asked to find five self-defining memories (Singer & Moffitt, 1991) according to the aforementioned description of a self-defining memory. We reasoned that the participants needed sufficient time for introspection and to select the five best memories fitting the criteria. They were therefore given 1 week to find these five memories, after first

receiving a sheet that explained the criteria for self-defining memory and that asked them to write both the title and details of each memory (where people were, whom they were with, what happened, and how they and the other people present responded to the event). In so doing, we expected to collect memories that were really important to the self and to filter out memories of events that were easily accessible but did not really define the self.

The second session took place seven (± 2) days after the first one. At the beginning of this session, participants narrated out loud each memory. All the memories given by the participants were recorded and then transcribed for analysis.

After relating each memory, participants were asked to assess with how many people they had shared this event. They also rated the emotional valence of the memory using a linear scale (from very negative to very positive) and completed the IES-R (Brunet et al., 2003). Because we intended to explore self-defining memories related to the topic of the illness, participants were asked to find three other self-defining memories, after the five memories had been narrated (these memories were not analyzed in the current part of the study). Then participants had to rate the subjective impact and personal significance according to the aforementioned scales (Wood & Conway, 2006). Finally, for each memory, they were asked to answer one last question: “To what extent was this event important for you and in what ways does it help you to describe who you are?” Responses were again recorded and then transcribed. This last question was intended to determine whether memories not spontaneously associated with meaning making when told were nonetheless associated with it when it was explicitly cued.

2.4. Scoring

2.4.1. Spontaneous meaning making (SMM)

Each memory was coded for the absence (0) or presence (1) of meaning making, using the criteria proposed by Singer and Blagov (2000). Meaning making was considered present when the participants stepped back from narrative events and descriptions to make an additional statement about the significance or meaning of the memory (e.g., “during this period when my parents divorced I realized I had left the world of my childhood and I had become mentally stronger but also harsher on others”).

2.4.2. Cued meaning making (CMM)

Meaning making was scored for explanations given by participants in response to the last question mentioned above: “To what extent was this event important for you and in what ways does it help you to describe who you are?” Each response was coded for the absence (0) or presence (1) of cued meaning making, using the same procedure as for SMM.

2.4.3. Content

Events relating to a theme referring to some aspect of illness (e.g., hospitalization, psychotic symptoms) were also identified.

The memories (240 events in total) were scored by two independent raters (JP and PV) blind to diagnosis ($\kappa = .84$ for SMM, $\kappa = .80$ for CMM, $\kappa = .77$ for content).

2.5. Statistical analysis

For each participant, the proportions of responses associated with spontaneous meaning making (SMM) and cued meaning making (CMM) were used for statistical analysis. They were subjected to an analysis of variance (ANOVA) for repeated measures with group (patients vs. controls) as a between-subject factor and cueing (spontaneous vs. cued) as within-subject factor. Regarding factors hypothesized to influence meaning making, the emotional valence of the memories, the proportion of traumatic memories (IES-R score of >24) and that of memories never shared with other people were compared between groups using *t*-tests. The Pearson product-moment correlation coefficients between, on the one hand, SMM and CMM and, on the other hand, IQ (WAIS-R, *f*-NART), clinical evaluation (PANSS), measures of executive functions (phonologic and semantic fluency, updating, mental flexibility) were computed in the group of patients. For correlations involving the flexibility task, two patients were excluded because the number of errors was too high ($<$ percentile 1). All analyses involving proportions were subjected to arcsine transformations.

3. Results

3.1. Clinical and neuropsychological measures (Table 1)

There was no significant difference between groups in terms of premorbid IQ, current IQ and level of self-esteem (all *ps* $> .05$). All tasks assessing executive functions showed impairment in patients compared with controls (all *ps* $< .02$) with the exception of number of errors in mental flexibility (*p* = .81).

3.2. Characteristics of memories (Table 2)

Regarding the seven items relating to subjective impact and personal significance, no significant difference was observed between groups (all *ps* $> .28$). Moreover, the number of memories scoring less than 4 on all items was very low in both

groups (four in patients and five in controls, out of 120). These results indicated that both controls and patients understood the procedure and selected personally highly significant memories in a similar way. The emotional valence of the memories did not differ between groups ($p = .50$). The proportion of traumatic memories and that of events never shared with other people did not differ between groups (all $ps > .10$). Thirty-one percent of self-defining memories in patients were rated as relating to a personal hospitalization and/or psychotic symptoms whereas only 2.5% of the events related to a personal illness in control participants.

3.3. Meaning making (Fig. 1)

The ANOVA performed on the proportions of memories with meaning making showed a significant group effect [$F(1, 46) = 22.7, p < .001$], with meaning making lower in patients than in controls, and a significant effect of cueing [$F(1, 46) = 53.0, p < .001$]. No interaction between factors was found ($p = .70$). Finally, after excluding self-defining memories associated with symptoms of PTSD in patients, memories relating to illness, or memories never shared with other people, proportions of memories associated with either SMM or CMM remained lower in patients than in controls (all $ps < .01$).

3.4. Correlational analyses

In patients, SMM was negatively correlated with the level of negative symptoms ($r = -.51, n = 24, p = .01$) and the global PANSS score ($r = -.50, n = 24, p = .01$). It was correlated positively with updating performance ($r = .51, n = 24, p = .01$) and negatively with median reaction time in the mental flexibility test ($r = -.47, n = 22, p = .03$). However, when PANSS scores were used as covariate, correlations with executive performance were no longer significant ($r = -.40, n = 24, p = .06$ for updating and $r = -.26, n = 22, p = .25$ for mental flexibility). No correlation was found between SMM and the duration of illness ($r = -.10, p = .64$). All other correlations were non-significant for SMM and no significant correlation was found for CMM. In control participants, no correlation was found for either SMM or CMM.

4. Discussion

The ability to give a meaning to important events in our life is a critical function allowing self-defining memories to be integrated in a more abstract and coherent representation of ourselves, i.e. how we perceive ourselves in our identity (Blagov & Singer, 2004) and providing a better understanding of past experiences so that social adjustment can be achieved in daily life. This ability was found to be impaired in patients with schizophrenia, a disease characterized by severe identity disorders (Minkowski, 2002; Parnas & Handest, 2003) and impaired social functioning (Burns & Patrick, 2007). We observed that the proportion of self-defining memories associated with spontaneous meaning making was lower in patients, replicating results obtained by Raffard et al. (2009, 2010). Patients also had a level of meaning making after cueing similar to that of spontaneous meaning making in controls, but the proportion of memories associated with cued meaning making remained lower in patients.

This impairment was observed under conditions where the subjective impact and personal significance of the retrieved memories (as assessed by scores on the seven rating scales) did not differ between patients and comparison participants, indicating that patients correctly understood the procedure and selected personally highly significant memories. What is

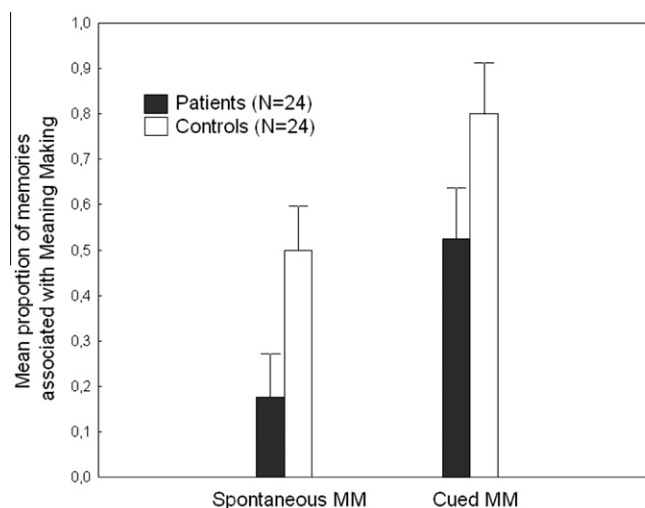


Fig. 1. Mean proportion (SD) of memories associated with spontaneous and cued Meaning Making (MM) in patients with schizophrenia and healthy controls.

striking is that patients were unable to extract meaning from memories they selected in full accordance with the instructions to retrieve memories that “help you to understand who you are as an individual”. This holds true both in spontaneous reports of memories and when a cueing method forced the patients to extract meaning. Therefore, our results cannot be explained by an inability of patients with schizophrenia to retrieve self-defining memories. In an attempt to eliminate a possible difference between groups due solely to a greater ease on the part of control participants to access and write their memories in detail, participants were given sufficient time to think about genuine significant memories and were asked to narrate them out loud instead of writing them down. Nor can the results be explained by factors such as levels of self-esteem, intelligence or the opportunity to share personal experiences with others, since these factors did not differ significantly between groups.

Thinking about a past event and extracting its meaning involves metacognitive and self-reflective processes. Metacognition refers to the capacity to think about one's own thinking, and for instance, to name and scrutinize one's thoughts and feelings about oneself. [Lysaker et al. \(2008\)](#) showed an impairment in metacognition in patients with schizophrenia, correlated with a decrease in executive functions; more precisely, awareness of one's thoughts and feelings was correlated with mental flexibility. Interestingly, we found mental flexibility and updating functions to be impaired in patients, and both were correlated with spontaneous meaning making. Based on these results, it is tempting to speculate that the ability to extract meaning from self-defining memories requires mental flexibility and updating processes for reflecting on the personal past from the standpoint of the present and, hence, preserving coherence of the self. However, our results are based on correlational approaches and correlations with executive functions were partly explained by the level of symptoms. Furthermore, the higher the level of the symptoms, especially negative symptoms, the lower the meaning making in patients. This means that even in patients with paranoid schizophrenia, negative symptoms are those playing the most important role in the lack of meaning making. Based on these results, we can assume that in patients with more pronounced negative symptoms, the ability to give a meaning to self-defining memories may be more severely impaired. Our results are in line with other studies showing a relationship between cognition and the level of negative symptoms ([Nieuwenstein, Aleman, & de Haan, 2001](#)). At least two different mechanisms could account for this correlation. Negative symptoms could have deleterious effects on the ability to learn and draw insights from one's past. Alternatively, poor meaning making capacities could be misinterpreted as reflecting negative symptoms in clinical practice. Finally, it should be noted that these correlations are no longer significant when computed with cued meaning making. The reasons for the lack of significant correlations with cued meaning making are unclear. One interpretation is that cued conditions of meaning making forced the patients to use executive functions and metacognitive processes more efficiently. The corollary of this interpretation is that it is the self-initiation of these cognitive and metacognitive processes that is impaired, rather than their execution ([Ragland et al., 2005](#)). However, cued meaning making is still poorer in patients than in comparison participants, which strongly suggests that meaning making involves other types of cognitive and metacognitive processes (e.g., evaluative and monitoring processes) that are impaired in schizophrenia. The identification of these processes warrants further study.

Another issue which deserves further study is that of self-defining memories relating to illness, which was significantly higher in patients than in controls. In particular, whether giving meaning to self-defining memories relating to illness, and learning and drawing insights from these memories could help patients be more aware of their illness has yet to be explored. Insight deficit is one of the main features of schizophrenia ([Amador, Strauss, Yale, & Gorman, 1991](#)), and an impaired awareness of illness may be seen as an inability to make sense of what happened during the illness at the most personal level ([Lysaker et al., 2008](#)). The ability to envision oneself as suffering from a mental illness also requires metacognitive and self-reflective processes which could be similar to those required for trying to extract meaning about past memories relating to illness. This issue highlights the influence of illness and distressing life events on autobiographical memories, which has already been described in other psychopathological conditions. For instance, themes of memories of patients suffering from anxiety or mood disorders are often associated with the specific patients' concerns about their disorder ([Mansell & Lam, 2004](#); [Reynolds & Brewin, 1999](#)). [Sutherland and Bryant \(2005\)](#) recently showed that self-defining memories were frequently related to past traumatic experiences in patients suffering from PTSD, whereas trauma survivors not suffering from PTSD rarely qualified their traumatic experiences as self-defining. This suggests that life altering events can have a profound impact on patients' perception of themselves, especially in the context of a psychological disorder. The events become a landmark both for the self and in autobiographical memory and consequently influence personal goals ([Berntsen, Willert, & Rubin, 2003](#); [Sutherland & Bryant, 2005](#)). In our study, the proportion of traumatic self-defining memories was not significantly higher in patients than in controls. However, a third of patients' self-defining memories referred to their illness, showing that these events constitute a significant part of patients' self-representation ([Blagov & Singer, 2004](#)). The proportion of freely recalled SDM relating to the illness was substantially higher in our study than in the study by [Raffard et al. \(2010\)](#). As in the study by [Sutherland & Bryant's \(2005\)](#), we investigated five self-defining memories rather than three as in [Raffard et al.'s](#) study; this may have raised the probability of selecting self-defining memories. Further studies exploring self-defining memories in other psychopathological conditions and especially those related to illness would be of great interest for a better understanding of how illness affects patients' self-representation (see also [Bury, 1982](#); [Carricaburu & Pierret, 1995](#); [Wilson, 2007](#)).

Our findings are likely to have clinical implications. First, the reduced ability of a patient with schizophrenia to extract meaning spontaneously from his or her personal history may explain the lack of coherence of life narratives. Second, given that self-defining memories play a crucial role in social relationships, lack of integration of personally significant experiences would contribute to social impairment in patients with schizophrenia ([Burns & Patrick, 2007](#)). In fact, “self-defining memories [are] salient and accessible to the individual when he or she forms new goals, enters new social situations, and adopts

new roles and identities” (Sutin & Robins, 2005). It was recently demonstrated that the ability to envision oneself in the future is impaired in schizophrenia (D’Argembeau et al., 2008): patients report fewer future plans than control participants, they have difficulty pre-experiencing future events related to these plans, and seldom link anticipated events to specific past events. One hypothesis is that self-defining memories are not taken into account by patients for future life decisions. This could partly explain the lack of coherence observed in their life. Third, the inability to extract meaning from self-defining memories may account for the impaired construction and maintenance of self and personal identity. Meaning making contributes to the coherence required to develop and support a cohesive and effective self (Conway et al., 2004). Finally, our study is likely to point to new directions for psychotherapy involving patients with schizophrenia, since the capacity to learn from past experiences and to incorporate these life lessons into current self-knowledge is a major goal of any psychotherapy. Singer (2005) developed a structured psychotherapy based on self-defining memories that encouraged patients to analyze the personal implications of these important events and guided them in the process of giving these events a meaning. As far as we know, this kind of therapy focused on meaning making has not yet been used with patients with schizophrenia despite the substantial body of work devoted to other forms of narrative therapies (France & Uhlin, 2006; Lysaker, France, Hunter, & Davis, 2005). We would assume that this psychotherapy could help patients gain a better awareness of their life and of critical events. As a result, they could make more appropriate plans for the future.

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